V . A . Introduction

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The process of summarizing the views, judgments, and opinions of a group of individuals leads to a certain degree of quantification in most Delphi exercises. Certainly the field of statistics offers a host of techniques for analyzing and summarizing the responses to Delphi questions. In addition, the nature of certain common question types used in the Delphi process lends itself to the incorporation of underlying models for the judgmental process that have been developed in such fields as psychology, decision theory, and operations research. In fact, the art of Delphi design has proceeded to a point where the body of literature has adapted many concepts and techniques from these other areas (see references on "Related Work" in Appendix) to specific application for the Delphi process.

In this and the following chapter, the reader is introduced to a few of the more significant attempts in this area of specialized techniques. The last words on the "best" methods to handle certain problems a r e far from being written. Therefore, a number of the papers in these sections present differing approaches, philosophies, or views on the handling of the same application.

One very common problem in Delphi is to get at the underlying relationships among possible future events. The existence of interrelationships is the reason for the complexity of many biological and social systems and for the counterintuitive nature of their behavior. Most individuals are simply unable to follow the impact of one change through the system; they assume independence of its various parts. One common approach, known as "cross impact," aims to alleviate this difficulty and probe the effect of interactions among elements of a system. The papers in this chapter represent three differing views or approaches to the cross-impact problem, and there are more to be found in the literature referenced in these articles. Our choice of these particular papers rests on both the completeness of the discussion of their approaches and their occurrence as recent work in the field.

The first paper dealing with cross impact, by Dalkey, utilizes the laws of probability calculus and rests on a fundamental assumption of the correctness of the Bayes theorem for analyzing the consistency of human judgment. In a sense this paper represents an approach arising out of current practices in the area of decision theory.

The second paper on cross impact, by Turoff, rejects the Bayes-type approach and seeks to establish an interaction model analogous to a quantum mechanical interaction model from the field of physics. It is quite clear these two papers are based upon opposing assumptions. In a broader context this difference of view is a result of our lack of understanding of the human perception and thought process. However, in the use of the cross-impact technique to supply relative weightings of relationships, it would probably be safe to say that either approach will give about the same relative rankings of impacts. If the reader desires, on the other hand, to lay bets on the actual probability estimates obtained, then he will have to first answer for himself such questions as whether people are, or should be, Bayesian decisionmakers.

The third paper on cross impact, by Kane, formulates a dynamic time dependent model for the problem. This approach rests on control-theory concepts and bears a

similarity, with respect to what the user sees, to the system dynamics type analysis (e.g., Forrester-Meadows). This third procedure defines the cross-impact problem in such a manner that it cannot, as an approach, be directly compared with the first two papers. In any case, the problem it solves is of interest and applicable to a large number of common situations. Its simplicity makes it a particularly useful pedagogical device. It has proven to be an excellent means to introduce laymen to complex systems, since the technique exhibits many of the characteristics which makes their behavior appear counterintuitive.

We can anticipate much more work in cross-impact analysis as we search for ways to include the more subtle interactions which so far have eluded our methodological capabilities.